

**Amendment to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. – 2. (canceled)

3. (currently amended) ~~The method of embedding digital watermark information according to Claim 2A~~ method of embedding digital watermark information  $b_1 - b_n$  ( $2 \leq n$ ) in image data, comprising the steps of:

dividing the image data into a plurality of areas S each consisting of  $M \times N$  ( $1 \leq M, N$ ) pixels;

defining an area G consisting of  $P \times Q$  ( $1 \leq P, Q$ ) of the areas S;

allocating each of the areas S constituting said area G to some one of: areas  $T_1 - T_n$  whose pixel values are changed, areas  $J_1 - J_k$  ( $1 \leq k$ ) in which information  $p_1 - p_k$  ( $1 \leq k$ ) specifying an embedding format for embedding said digital watermark information  $b_1 - b_n$  in said areas  $T_1 - T_n$ , and areas  $H_1 - H_m$  ( $1 \leq m$ ) whose pixel values are not changed;

corresponding each of said  $T_1 - T_n$ , whose pixel values are changed, to each of said digital watermark information  $b_1 - b_n$  and changing the pixel value of each area T according to a bit value;

locating areas  $T_1 - T_n$ , areas  $J_1 - J_k$  and areas  $H_1 - H_m$  in a predetermined same arrangement in said area G; and

locating said area G repeatedly over entire image data,

wherein:

said digital watermark information  $b_1 - b_n$  is embedded by increasing or decreasing pixel data values in the corresponding areas  $T_1 - T_n$  according to a bit value (0, 1) of each bit of the digital watermark information  $b_1 - b_n$ ; and

said information  $p_1 - p_k$  specifying said embedding format is embedded such that said information indicates a pattern of respective increasing/decreasing directions in the area  $T_1 - T_n$  for a bit value of the digital watermark information, in each area G to which the area  $J_1 - J_k$  embedded with said information  $p_1 - p_k$  belong.

4. – 6. (canceled)

7. (currently amended) A method of extracting digital watermark information, for extracting the digital watermark information  $b_1 - b_n$  ( $2 \leq n$ ), a bit value of the digital watermark information being 0 or 1, from image data in which said digital watermark information is embedded, comprising steps of:

dividing the image data into a plurality of areas S each consisting of  $M \times N$  ( $1 \leq M, N$ ) pixels; detecting areas  $H_1 - H_m$  ( $1 \leq m$ ) in which any of bit information 0 and 1 is not embedded, from said plurality of areas S;

recognizing a plurality of areas G each consisting of  $P \times Q$  ( $1 \leq P, Q$ ) of the areas S, said plurality of areas G being located on said image data, and said recognition being carried out by comparing locations of said detected areas  $H_1 - H_m$  on said image data and locations of predetermined areas  $H_1 - H_m$  in the areas S;

in each of the plurality of areas G recognized, extracting information  $p_1 - p_k$  ( $1 \leq k$ ) from areas  $J_1 - J_k$  in which said information  $p_1 - p_k$  ( $1 \leq k$ ) in which said information  $p_1 - p_k$  ( $1 \leq k$ ) should be embedded, said information  $p_1 - p_k$  specifying an embedding format for embedding said digital watermark information  $b_1 - b_n$  respectively in said areas  $T_1 - T_n$ ;

recognizing the embedding format of the digital watermark information  $b_1 - b_n$  in the areas  $T_1 - T_n$  in the areas G in question; and

extracting the digital watermark information  $b_1 - b_n$  from the areas  $T_1 - T_n$ , according to the recognized embedding format  
~~The method of extracting digital watermark information according to Claim 6,~~

wherein:

for each of the plurality of groups G recognized, the information  $p_1 - p_k$  embedded in the areas  $J_1 - J_k$  is extracted to recognize a pattern of increasing/decreasing directions of pixel data values for a bit value of the digital watermark information, in the area G in question; and

each bit value of the digital watermark information  $b_1 - b_n$  embedded in the areas  $T_1 - T_n$  is detected according to the recognized pattern of increasing/decreasing directions.

8. – 10. (canceled)

11. (currently amended) A program product for making a computer execute a method of embedding digital watermark information  $b_1 - b_n$  ( $2 \leq n$ ) in image data, comprising:

codes for dividing the image data into a plurality of areas S each consisting of  $M \times N$  ( $1 \leq M, N$ ) pixels;

codes for defining an area G consisting of  $P \times Q$  ( $1 \leq P, Q$ ) of the areas S;

codes for allocating each of the areas S constituting said area G to some one of: areas  $T_1 - T_n$  whose pixel values are changed, areas  $J_1 - J_k$  ( $1 \leq k$ ) in which information  $p_1 - p_k$  ( $1 \leq k$ ) specifying an embedding format for embedding said digital watermark information  $b_1 - b_n$ , a bit value of the digital watermark information being 0 or 1, in said areas  $T_1 - T_n$ , and areas  $H_1 - H_m$  ( $1 \leq m$ ) whose pixel values are not changed;

codes for corresponding each of said  $T_1 - T_n$  whose pixel values are changed, to each of said digital watermark information  $b_1 - b_n$  and changing the pixel value of each area T according to a bit value;

codes for locating one or more areas  $T_1 - T_n$ , and areas  $J_1 - J_k$  in a predetermined same arrangement in said area G;

codes for locating said area G repeatedly over entire image data;~~The program product according to Claim 10,~~

~~further comprising:~~

codes for embedding said digital watermark information  $b_1 - b_n$  by increasing or decreasing pixel data values in the corresponding areas  $T_1 - T_n$  according to a bit value (0, 1) of each bit of the digital watermark information  $b_1 - b_n$ ; ~~and~~

codes for embedding said information  $p_1 - p_k$  specifying said embedding format such that said information indicates a pattern of respective increasing/decreasing directions in the areas  $T_1 - T_n$  for a bit value of the digital watermark information, in each area  $G$  to which the areas  $J_1 - J_k$  embedded with said information  $p_1 - p_k$  belong; and

a computer readable storage medium for holding the codes.

12. – 14. (canceled)

15. (currently amended) A program product for making a computer execute a method of extracting digital watermark information  $b_1 - b_n$  ( $2 \leq n$ ), a bit value of the digital watermark information being 0 or 1, from image data in which said digital watermark information is embedded, comprising:

codes for dividing the image data into a plurality of areas  $S$  each consisting of  $M \times N$  ( $1 \leq M, N$ ) pixels;

codes for detecting areas  $H_1 - H_m$  ( $1 \leq m$ ) in which any of bit information 0 and 1 is not embedded, from said plurality of areas  $S$  codes for recognizing a plurality of areas  $G$  each consisting of  $P \times Q$  ( $1 \leq P, Q$ ) of the areas  $S$ , said plurality

of areas G being located on said image data, and said recognition being carried out by comparing locations of said detected areas  $H_1 - H_m$  on said image data and locations of predetermined areas  $H_1 - H_m$  in the areas S;

codes for extracting, in each of the plurality of areas G recognized, information  $p_1 - p_k$  ( $1 \leq k$ ) from areas  $J_1 - J_k$  in which said information  $p_1 - p_k$  ( $1 \leq k$ ) should be embedded, said information  $p_1 - p_k$  specifying an embedding format for embedding said digital watermark information  $b_1 - b_n$  respectively in said areas  $T_1 - T_n$ ;

codes for recognizing the embedding format of the digital watermark information  $b_1 - b_n$  in the areas  $T_1 - T_n$  in the area G in question;

codes for extracting the digital watermark information  $b_1 - b_n$  from the areas  $T_1 - T_n$  according to the recognized embedding format;~~The program product according to Claim 14,~~

~~further comprising:~~

codes for extracting, for each of the plurality of groups G recognized, the information  $p_1 - p_k$  embedded in the areas  $J_1 - J_k$  to recognize a pattern of increasing/decreasing directions of pixel data values for a bit value of the digital watermark information, in the area G in question, and to detect each bit value of the digital watermark information  $b_1 - b_n$  embedded in the areas  $T_1 - T_n$  according to the recognized pattern of increasing/decreasing directions; and

a computer readable storage for holding the codes.

16. - 18 (canceled)

19. (currently amended) An apparatus for embedding digital watermark information  $b_1 - b_n$  ( $2 \leq n$ ) in image data, comprising:

a processing part for dividing the image data into a plurality of areas S each consisting of  $M \times N$  ( $1 \leq M, N$ ) pixels;

a processing part for defining an area G consisting of  $P \times Q$  ( $1 \leq P, Q$ ) of the areas S;

a processing part for allocating each of the areas S constituting said area G to some one of: areas  $T_1 - T_n$  whose pixel values are changed, areas  $J_1 - J_k$  ( $1 \leq k$ ) in which information  $p_1 - p_k$  ( $1 \leq k$ ) specifying an embedding format for embedding said digital watermark information  $b_1 - b_n$  in said areas  $T_1 - T_n$ , and areas  $H_1 - H_m$  ( $1 \leq m$ ) whose pixel values are not changed;

a processing part for corresponding each of said  $T_1 - T_n$  whose pixel values are changed, to each of said digital watermark information  $b_1 - b_n$  and changing the pixel value of each area T according to a bit value;

a processing part for locating one or more areas  $T_1 - T_n$ , one or more areas  $J_1 - J_k$  and one or more areas  $H_1 - H_m$  in a predetermined same arrangement in said area G;

a processing part for locating said area G repeatedly over entire image data;

~~The apparatus for embedding digital watermark information according to Claim 18,~~

~~further comprising:~~

a processing part for embedding said digital watermark information  $b_1 - b_n$  by increasing or decreasing pixel data values in the corresponding areas  $T_1 - T_n$  according to a bit value (0, 1) of each bit of the digital watermark information  $b_1 - b_n$ ; and

a processing part for embedding said information  $p_1 - p_k$  specifying said embedding format such that said information indicates a pattern of respective increasing/decreasing directions in the area  $T_1 - T_n$  for a bit value of the digital watermark information, in each area  $G$  to which the areas  $J_1 - J_k$  embedded with said information  $p_1 - p_k$  belong.

20. - 22 (canceled)

23. (currently amended) An apparatus for extracting digital watermark information  $b_1 - b_n$  ( $2 \leq n$ ), a bit value of the digital watermark information being 0 or 1, from image data in which said digital watermark information is embedded, comprising:

a processing part dividing the image data into a plurality of areas  $S$  each consisting of  $M \times N$  ( $1 \leq M, N$ ) pixels;

a processing part for detecting areas  $H_1 - H_m$  ( $1 \leq m$ ) in which any of bit information 0 and 1 is not embedded, from said plurality of areas  $S$ ;



a processing part for recognizing a plurality of areas G each consisting of  $P \times Q$  ( $1 \leq P, Q$ ) of the areas S, said plurality of areas G being located repeatedly over entire said image data, and said recognition being carried out by comparing locations of said detected areas  $H_1 - H_m$  on said image data and locations of predetermined areas  $H_1 - H_m$  in the areas S; a processing part for extracting, in each of the plurality of areas G recognized, information  $p_1 - p_k$  ( $1 \leq k$ ) from areas  $J_1 - J_k$  in which said information  $p_1 - p_k$  ( $1 \leq k$ ) should be embedded, said information  $p_1 - p_k$  specifying an embedding format for embedding said digital watermark information  $b_1 - b_n$  respectively in said areas  $T_1 - T_n$ ;

a processing part for recognizing the embedding format of the digital watermark information  $b_1 - b_n$  in the areas  $T_1 - T_n$  in the area G in question;

a processing part for extracting the digital watermark information  $b_1 - b_n$  from the areas  $T_1 - T_n$ , according to the recognized embedding format; and

~~The apparatus for extracting digital watermark information according to Claim 22,~~

~~further comprising:~~

a processing part for extracting, for each of the plurality of groups G recognized, the information  $p_1 - p_k$  embedded in the areas  $J_1 - J_k$ , to recognize a pattern of increasing/decreasing directions of pixel data values for a bit value of the digital watermark information, in the area G in question, and to detect each bit value of the digital watermark information  $b_1 - b_n$  embedded in the areas  $T_1 - T_n$ , according to the recognized pattern of increasing/decreasing directions.

24. – 26. (canceled)